REMARKS

The Examiner rejected claims 8 and 9 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner rejected claims 1-4, 6, 7 and 10-19 under 35 U.S.C. § 102(e) as being anticipated by Perriello. The Examiner also rejected claim 5 under 35 U.S.C. § 103(a) as being obvious over Perriello. Additionally, the Examiner rejected claims 1 and 15-19 under 35 U.S.C. § 102(b) as being anticipated by Schuring. Further, the Examiner rejected claims 1, 15, 18 and 19 under 35 U.S.C. § 102(b) as being anticipated by Kawabata et al. Moreover, the Examiner rejected claims 16 and 17 under 35 U.S.C. § 103(a) as obvious over Kawabata et al.

The Examiner further rejected claims 2-7 and 10-14 under 35 U.S.C. § 103(a) as obvious over Kawabata ore Schuring as applied to claims 1 and 15-17 above, and further in view of Udell et al. The Examiner also rejected claims 1-4, 10, 14, 15, 18, and 19 under 35 U.S.C. § 102(b) as being anticipated by Carter. Additionally, the Examiner rejected claim 5 under 35 U.S.C. § 103(a) as being obvious over Carter. Moreover, the Examiner rejected claims 8 and 9 under 35 U.S.C. § 103(a) as being obvious over Carter, Schuring et al. Kawabata et al. or Perriello. Further, the Examiner rejected claims 1-5, 9, 10, 15, 18 and 19 under 35 U.S.C. § 102(b) as being anticipated by Keist et al. Lastly, the Examiner rejected claims 6, 7, 11, 17, and 17 under 35 U.S.C. § 103(a) as obvious over Keist et al.

Each of these rejections is addressed individually below

The Section 112 Claim Rejections:

The Examiner rejected claims 8 and 9 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point our and distinctly claim the subject matter which applicant regards as the invention. The Examiner also objected to the use of the trademark GeoProbe as not generically described in the specification.

The Applicant has amended the application to cancel claims 8 and 9. Thus, it is submitted that the section 112 rejections have been overcome. However, it is also submitted that the GeoProbe installation process would be well known by one of ordinary skill in the art. It is further submitted that the airjet installation technique would also be well known by one of ordinary skill in the art.

The Section 102 Claim Rejections:

Claim 1:

Independent claim 1 as amended requires groundwater remediation method including a supply of substantially pure liquid oxygen that is converted to vapor oxygen. The substantially pure oxygen vapor is conveyed to a regulating mechanism. The substantially pure liquid oxygen vapor is delivered through the regulating mechanism to at least one injection point and into the subterranean body of groundwater. An amount of microbials are also delivered to the at least one injection point and into the subterrancan body of groundwater to assist in reducing the level of contaminants. Moreover, the method operates such that the pressurization of the supply of liquid oxygen and delivery thereof does not require electricity or any mechanical parts such that the method can operate continuously.

Claim 10:

Independent claim 10 as amended requires a system for naturally remediating a contaminated subterranean body of groundwater including a plurality of injection points extending below ground to intersect the body of groundwater. The system has a supply of concentrated liquid oxygen in communication with each of the plurality of injection sites. The plurality of injection sites are also in communication with a supply of microbials. The system includes a mechanism for conveying the concentrated oxygen in vapor form and the microbials to each of said plurality of injection points. Further, the system can operate twenty-four hours a day and requires no electricity or moving parts to operate.

Claim 15:

Independent claim 15 as amended requires a method for remediating contaminated groundwater, including a supply of liquid oxygen that is converted to vapor oxygen due to natural pressurization in the holding container. The oxygen vapor is removed from the supply liquid oxygen and then conveyed to a pressure regulator. The pressurized oxygen vapor is injected into the groundwater. The system includes a supply of microbials such that an amount of microbials can be injected into the groundwater. The method operates such that the contaminated groundwater can be remediated continuously without the need for electricity or moving parts.

The Section 102(e) Claim Rejections Based on Perriello:

The Examiner rejected claims 1-4, 6-7, and 10-19 under 35 U.S.C. § 102(e) as being anticipated by Perriello. However, Perriello does not teach all the elements of any of the claims. Perriello does not teach claim 1 for at the least the reason that Perriello does not teach conveying substantially pure oxygen vapor to a regulating mechanism. Moreover, Perriello does not teach or suggest an oxygen injection system where the pressurization of the supply of liquid oxygen and delivery thereof does not require electricity or any mechanical parts such that the method can operate continuously. To the contrary, Perriello requires an air injection system having "an air compressor 40" that "is eclectically connected through a fuse panel disconnect system 46 to an electrical power supply 47." (Col. 5, lines 30-47.) Similarly, as to claim 10, Perriello does not teach a system that can operate twenty-four hours a day and requires no electricity or moving parts to operate. Also, as to claim 15, Perriello does not teach a system where the contaminated groundwater can be remediated continuously without the need for electricity or moving parts.

It is therefore submitted that claims 1, 10, and 15 are allowable over Perriello and that dependent claims 2, 5, 9, 12-14, 18-29, which depend therefrom are allowable for the same reasons provided above in connection with the independent claim from which they depend.

The Section 102(a) Claim Rejections Based on Schuring:

The Examiner rejected claims 1 and 15-19 under 35 U.S.C. § 102(b) as being anticipated by Schuring. Schuring also fails to teach all the elements of Applicant's claimed invention. Schuring also fails to teach the claimed invention for at least the reason that Schuring requires apparatus such as a pump to compress or otherwise pressurize the air that is injected into the soil to achieve the fracturing of the soil formation to be treated. As such, Schuring does not teach a system that operates without the need for electricity or moving parts and can operate continuously.

Therefore, it is submitted that claims 1 and 15 are allowable over Schuring and that claims 18-19, which depend from claim 15 are allowable for the same reasons provided above.

The Section 102(a) Claim Rejections Based on Kawabata et al.:

The Examiner rejected claims 1, 15, 18 and 19 under 35 U.S.C. § 102(b) as being anticipated by Kawabata et al.

Kawabata et al. also fails to teach all the elements of Applicant's claimed invention. Kawabata et al. also fails to teach the claimed invention for at least the reason that Kawabata et al. requires apparatus such as "a liquid agent pressure pump" and "a pressure pump by which the gas is sent under pressure into the soil." Kawabata et al. teaches that:

> In order to drive the injected liquid agent further into the soil, the liquid agent is injected into the soil by running the pump 2 for a predetermined length of time, and then under the conditions that the water content of the soil by running the pump 2 for a predetermined length of time.

(Col. 6, lines 32-34.) As such, Kawabata et al. does not teach a system that operates without the need for electricity or moving parts and can operate continuously.

Therefore, it is submitted that claims 1 and 15 are allowable over Kawabata et al. and that claims 18-19, which depend from claim 15 are allowable for the same reasons provided above.

The rejection of claims 16 and 17 under 35 U.S.C. § 103(a) as obvious over Kawabata et al. are now moot in view of the cancellation of these claims without prejudice. It is submitted that claims 2, 5, and 12-14, which stand rejected as obvious over Kawabata or Schuring as applied to claims 1 and 15-17 above, and further in view of Udell et al, are considered to be allowable for the same reasons provided above in connection with the claims from which they depend.

The Section 102(a) Claim Rejections Based on Carter et al.:

The Examiner rejected claims 1-4, 10, 14, 15, 18 and 19 under 35 U.S.C. § 102(b) as anticipated by Carter.

Applicant's invention of claims 1, 10, and 15 are not suggested or taught by Carter. Initially, Carter does not teach or suggest a supply of liquid oxygen. The Examiner states that Carter teaches a supply of liquid oxygen because "the oxygen is stored in a 60-gallon tank (24) after generation by the oxygen generator and prior to injection as a gas, and only liquids are described in terms of gallons." Instead, Carter teaches storing the vapor in a large tank (such as a 60 gallon drum), which can also be used to hold liquids. Carter also teaches using a compressor 22, which appears to generate oxygen from ambient air by removing nitrogen and other gases from the air to produce oxygen vapor. The oxygen vapor is then pressurized by a pressure swing adsorption oxygen generator (PSA) 26. The pressurized oxygen vapor is then conveyed to a storage tank 24, where the oxygen vapor is stored. The ambient air and oxygen vapor are always maintained in a gaseous form. Thus, Carter does not teach the utilization of providing a supply of liquid oxygen. For this reason alone, it is submitted that claims 1, 10, and 15 are allowable over the art.

The claimed supply of liquid oxygen is important because it allows for the system to operate essentially maintenance free and without the need for electricity or mechanical moving parts. Carter, on the other hand, requires the use of a compressor 22, which is typically electrically operated and at the very least requires moving parts to generate the oxygen vapor from ambient air. Further, the PSA also typically requires electricity to

operate and also utilizes moving parts. As such, the system in Carter requires periodic maintenance and is subject to break down due to the utilization of moving parts. Moreover, Carter specifically teaches that the system does not – and cannot operate continuously. At col. 5, Carter teaches that "oxygen is injected for 5 minutes at about 30 min. intervals, at an oxygen pressure of about 1 psi." It cannot operate continuously because Carter teaches that the compressor "has a capacity for delivery of the oxygen at about 1 psi at a rate of approximately 7 standard cubic feet per hour (scfh) to each one of the injection sites. Thus, the system can only operate when the compressor has generated oxygen vapor.

Thus, Carter does not teach a system that can operate continuously and that operates without electricity and moving parts. Independent claims 1, 10, and 15 are submitted to be allowable over Carter for this additional reason. It is further submitted that claims 2, 14, 18, and 19, which depend from claims 1 and 15, are deemed to be allowable for the same reasons provided above. It is also submitted that claim 5, which stands rejected under 35 U.S.C. § 103(a), is allowable for the same reasons provided above. Additionally, claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as obvious over Carter, Schuring et al., Kawabata et al. or Perriello. The rejection of claim 8 is believed to be moot as claim 8 has been cancelled without prejudice. It is submitted that claim 9, which depends from claim 1, is allowable for the same reasons provided above in connection with claim 1.

The Section 102(b) Claim Rejections of Keist et al.:

The Examiner rejected claims 1-5, 9, 10, 15, 18 and 19 under 35 U.S.C. § 102(b) as anticipated by Keist et al.

Keist et al. also fails to teach all the elements of Applicant's claimed invention. Keist et al. fails to teach the claimed invention for at least the reason that Keist et al. teaches a delivery system including:

> a power section 12, which . . . . includes an internal combustion engine . . . fed by a suitable fuel source 16. The internal combustion engine 14 drives a hydraulic pump 20 through a clutch assembly 18. The pump 20 provides

> oil under pressure over a line 22 to a control valve 24, a line 26, a pressure compensated flow control 28, and a line 30 to a high torque – low speed hydraulic motor 32.

(Col. 4, lines 20-29.) As such, Keist et al. does not teach a system that operates without the need for electricity or moving parts and can operate continuously.

Therefore, it is submitted that claims 1, 10 and 15 are allowable over Keist et al. and that dependent claims 2, 5, 9, and 19 which depend from one of claims 1 and 15 are allowable for the same reasons provided above in connection with the claims from which they depend.

Claims 6, 7, 11, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as obvious over Keist et al. However, it is submitted that each of these claim rejections is now moot in view of the cancellation of these claims above without prejudice.

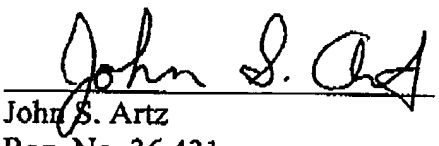
Conclusion:

It is respectfully submitted that all objections and rejections of record have been overcome and that all pending claims are now in condition for allowance. A notice of allowance is therefore earnestly solicited.

If the Examiner should have any questions, he is urged to contact the undersigned at 248-223-9500.

Respectfully submitted,

ARTZ & ARTZ, P.C.



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"VERSION WITH MARKINGS TO SHOW CHANGES"

In the Specification:

Kindly substitute the following for paragraph 31:

However, in the preferred embodiment, a plurality of injection tubes 46 are utilized to convey the pure oxygen from the source 12 and microbials from the source 42 to the injection sites 16. While the source of oxygen 12 is preferably initially in liquid form, the pressure in the source 12 causes the liquid to turn to vapor. It is the pure oxygen vapor that is captured and then delivered through the delivery system and reacts with the microbials. The injection points 16 and the injection tubes 46 can be installed by any of a variety of methods, including typical hollow stem auger with sand backfill. This is primarily for sites interbedded with clays and sites. Alternatively, the injection tubes 38 may be installed by known [GeoProbe®] GEOPROBE® (GEOPROBE is a registered trademark of KEJR Engineering, Inc. of Kansas) installation techniques, which is a well known installation process.

In the Claims:

Kindly substitute the following for pending claim 1:

1. (Amended) A method for remediating a contaminated region of a subterranean body of groundwater to destroy or reduce the initial concentration levels of contaminants, comprising:

providing at least one injection point extending from above ground to the subterranean body of groundwater;

providing a supply of substantially pure liquid oxygen;

converting said liquid oxygen to vapor oxygen;

conveying said substantially pure oxygen vapor to a regulating mechanism;

delivering said substantially pure liquid oxygen vapor through said regulating mechanism to said at least one injection point and into the subterranean body of groundwater; and

delivering an amount of microbials to said at least one injection point and into the subterranean body of groundwater to assist in reducing the level of contaminants;

whereby pressurization of said supply of liquid oxygen and delivery thereof does not require electricity or any mechanical parts such that the method can operate continuously.

Kindly cancel claims 3 and 4 without prejudice.

Kindly cancel claims 6 through 8 without prejudice.

Kindly substitute the following for pending claim 10:

10. (Amended) A system for naturally remediating a contaminated subterranean body of groundwater to destroy or reduce the levels of contaminants, comprising:

a plurality of injection points extending below ground to intersect the body of groundwater;

a supply of concentrated liquid oxygen in communication with each of said plurality of injection sites;

a supply of microbials in communication with each of said plurality of injection sites;

a mechanism for conveying said concentrated oxygen in vapor form and said microbials to each of said plurality of injection points; and

whereby the system can operate twenty-four hours a day and requires no electricity or moving parts to operate.

Kindly cancel claim 11 without prejudice.

Kindly substitute the following for pending claim 15:

15. (Amended) A method for remediating contaminated groundwater, comprising:

providing a supply of liquid oxygen;

allowing said liquid oxygen to convert to vapor oxygen due to natural pressurization in said holding container;

removing oxygen vapor from said supply of liquid oxygen;

conveying said oxygen vapor to a pressure regulator;

[regulating the pressure of said removed oxygen;]

injecting said pressurized oxygen vapor into the groundwater; [and]

providing a supply of microbials; and

injecting an amount of microbials from said supply of microbials into the groundwater;

whereby the contaminated groundwater can be remediated continuously without the need for electricity or moving parts.

Kindly cancel claims 16 and 17 without prejudice.

Kindly add the following additional claims 20-29:

20. (New) The method of claim 2, wherein said step of delivering said oxygen is accomplished through the use of a control panel interposed between said supply of concentrated liquid oxygen and said plurality of injection points.

21. (New) The method of claim 20, wherein said control panel includes a plurality of flow meters for regulating the flow rate of oxygen to said plurality of injection points.

22. (New) The method of claim 2, further comprising:

monitoring the level of contaminants in the subterranean body of groundwater periodically.

23. (New) The system of claim 10, wherein said plurality of injection points are arranged in a grid pattern.

24. (New) The system of claim 10, further comprising:

a pressure regulator for regulating the flow of oxygen from said supply of liquid oxygen to each of said plurality of injection points.

25. (New) The system of claim 10, further comprising:

at least one monitoring well to allow for periodic monitoring of the level of contaminants in the subterranean body of groundwater.

26. (New) The method of claim 15, wherein said oxygen and said microbials are injected into the groundwater by a plurality of injection points.

27. (New) The method of claim 26, wherein said step of injecting said oxygen is accomplished through the use of a control panel interposed between said supply of concentrated liquid oxygen and said plurality of injection points.

28. (New) The method of claim 27, wherein said control panel includes a plurality of flow meters for regulating the flow rate of oxygen to said plurality of injection points.

29. (New) The method of claim 26, wherein said plurality of injection points are arranged in a grid pattern.